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Public Health Reports

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—Editorial—

Interrelation of Social Problems

This month we publish the second of a series of studies of mortality among people discharged from tuberculosis sanatoria in New Jersey. The study includes 1,245 persons who had been in sanatoria for varying lengths of time—some for as little as 3 months or less, others for years. A number of almost inseparable factors have influenced these people and we must attempt to explore them insofar as possible to learn which are significant. A person with tuberculosis has many needs and before we can meet them we must understand them fully.

Medical treatment is, of course, the obvious essential. But also to be considered are many factors which have a bearing upon the way a patient responds to his particular therapy. What are these factors? What facilities do our communities have to deal with them? Most patients face a variety of psychological, financial, and personal adjustments which cannot be separated from one another. Emotional reactions to the disease itself influence the acceptance of the diagnosis and treatment. Fears of death and incapacity and resistance to dependency are pertinent realities. A patient may experience a sense of lowered status in his home. Children are deprived of the care of parents. Separation from home, loss of the power to make all personal decisions, necessary changes in vocational plans, careers, education, and way of living, all contribute to the problem of tuberculosis.

These emotional reactions are often intensified when there is financial strain or distress. Financial and psychological problems are interdependent and this very interdependence is a complicating factor. One may hide the other.

Although we are aware of some of the financial problems of some of the patients, few communities have any estimate of the total financial

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This is the fortieth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

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needs of the tuberculous group. Little is known of the actual number of tuberculous persons receiving financial assistance and even less is known of the financial problems of persons not receiving help from agencies. Because some examples of need are often so compelling, and because we invest so much time and effort in helping individual patients, we can arrive at the conclusion that we are giving assistance to large numbers of people. This is not necessarily so. A cursory examination of hospital and agency caseloads in several cities reveals only a very small number of tuberculosis patients or their families receiving financial aid. We need an objective count to replace the mental multiplication which has been almost inevitable so far. Most financial problems can be alleviated if we know what they are. How many patients have to give up a business? How many patients resist medical recommendations and delay treatment? How many wives have to go to work? How many families are broken? How many fathers need help to keep their families together? What housekeeping services are needed to prevent family disruptions? We must know the answers to such questions in order to attain adequate solutions.

In some areas there are the beginnings of inquiry into the subject of financial need as it is related to tuberculosis. Once some progress in this area is achieved, the other social components in tuberculosis will become increasingly clarified.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Studies of Patients Discharged From Tuberculosis Sanatoria

II. Mortality rates associated with selected characteristics of the patient population

By Agnes W. Brewster, A. B., and Ralph Carr Fletcher, M. A.*

This report, the second in a series dealing with a follow-up study [1] of tuberculosis patients, is limited to one of the areas in which such studies can be expected to yield useful data, namely mortality rates. Rates are given, first to show mortality during a 5-year period among a group of patients after they had been discharged for the first time from the sanatoria of one State, and second to bring out the association of certain characteristics of these patients and subsequent mortality.

Tuberculosis patients discharged from sanatoria face the future with various life expectancies. Their subsequent mortality is in part influenced, as in the general population, by sex, race and age.

The fact that they have had tuberculosis and have been treated for it may also affect their length of life. For one thing, tuberculosis is a disease which places great stress upon the family involved. It sometimes reduces the level of living to such a point that the mortality risk of the patient returning to the family group may be increased, since higher mortality rates are associated with lower family incomes. Premature efforts on the part of the patient to return to gainful employment in order to restore the standard of living may result in relapse and death. The marital status of the patients in this study, which gives some indication of family responsibilities, seemed therefore worth considering. The stage of disease on admission or discharge has for obvious reasons been generally associated with subsequent mortality of tuberculous patients (*1*, *2*, *3*, *4*, *5*, *6*). Differences in the length of the patients' residence in the sanatoria, which may in turn be influenced by the stage of the disease, and variations in the clinical condition on discharge also seemed worth investigating in relation to mortality.

In this study no distinction has been drawn between patients discharged "with consent" and those discharged "against advice." When the discharge of the patient has been "with consent" it may be assumed that he has obtained the maximum benefit from his period of hospital treatment. When his discharge has been "against advice"

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[1] The first in this series, which dealt with a method of collecting basic data from central record systems, appeared in Pub. Health Rep. 63: 427–447 (1948).

the patient, in departing, has rejected medical treatment. The authors consider this classification, usually termed "manner of discharge," so significant that they have reserved its consideration for a separate paper. Among those discharged "against advice" mortality rates were about three times as high as among those whose discharge was approved.

This review of the characteristics which seem to have some bearing on subsequent mortality of patients covers the items which were available in the New Jersey records. Other writers have considered mortality in relation to the status of the sputum on discharge and in relation to collapse therapy treatment. Income, occupation and education of patients may also be reflected in post-sanatorium mortality since they may influence the seeking of diagnosis, acceptance of treatment, and post-sanatorium behavior. Data were not available on these items—sputum status, collapse therapy treatment, income, education and occupation. Follow-up studies including some or all of these factors would make a worthwhile contribution to our knowledge of tuberculosis.

Materials and Methods

Materials. The study is based on the records of 1,245 patients, 677 men and 568 women, discharged after their first period of sanatorium care from the public sanatoria of New Jersey between July 1, 1941 and June 30, 1942. The study materials were obtained from the State central file maintained by the New Jersey State Department of Institutions and Agencies and from the file of death certificates in the State Bureau of Vital Statistics. Careful checking indicated that these sources produced almost complete information on readmissions to the sanatoria of the State and on all deaths occurring among the discharged patients.

A detailed description of the population is contained in the first report in the series, with supplementary tabulations presented in the appendix of the present report. The study group of 1,245 people included 63 nonwhite males and 73 nonwhite females, comprising 11 percent of the whole group. Age range was from 17 to 80 years at the time of discharge, with a median of 37 for the males and 27 for the females. Slightly more than half the males were married, 37 percent were single and the remainder (8 percent) were divorced, widowed, or separated when they were admitted to the sanatorium. About 45 percent of the females were married, another 45 percent single and the rest divorced, widowed or separated on first admission to the institution.

On admission, 45 percent of the patients had been diagnosed as far advanced, 40 percent as moderately advanced and 15 percent as minimal cases of tuberculosis. Among the males there were slightly more

far advanced cases (47 percent) than among the females (44 percent).

Although a greater proportion of cases were in the advanced categories, males left the institutions in greater numbers in the first months of sanatorium residence, 40 percent leaving before 6 months had elapsed compared with only 31 percent of the females. Consequently, the females on discharge had proportionately more cases arrested or quiescent.

Method. All follow-up studies have a common problem—the impossibility of locating every case after a lapse of years. Patients are lost because they move to other health jurisdictions, change their names through marriage, deliberately conceal a tuberculous history for a variety of reasons, and because death certificates are not allocated to the place of established residence.

The life-table approach to the analysis of biological data makes comparisons possible between groups observed at different periods of time or for differing lengths of time. When persons are observed for less than the full period of the follow-up study because they cannot be traced, the total number is usually adjusted for the losses. Generally such people are counted as having been observed for 6 of the 12 months making up the person-year.[2] It was not necessary to make such an adjustment in the data collected in New Jersey because patients were considered to have been observed for the full 5 years unless they had died.[3] The application of this adjustment to studies of discharged patients, when some of them have been observed for less than the full period, is clearly shown by Hilleboe (*1*).

The mortality rates were obtained by dividing the number of patients who died within a given year, by the number present at the beginning of that year. The 5-year cumulative death rate was obtained by dividing the total number who died during the 5 years by the number who were present at the beginning of observation (i. e., at the time of discharge from the sanatoria). The rates are based on all deaths, regardless of cause.

Some of the classifications used in this paper contain very small numbers of persons and deaths. Such rates have a relatively large standard error and should be treated with caution. They are nevertheless included because the authors wish to emphasize the importance of these classifications for future follow-up studies. Wherever the established rate is based on 50 or fewer persons of whom 5 or less died, the rates have been designated by italics in the tables. In evaluating the rates not appearing in italics, reference should be made to the tables found in the appendix of this report and in the body of the previous report. These tables give the populations for which the rates are derived.

[2] Person-year: One person observed for one 12-month period.

[3] See pages 430–435 of the first report for an explanation of this point.

Findings

The follow-up showed that 914 of the 1,245 patients were still alive and 331 (26.6 percent) had died at the end of the 5-year study period. Of the number who had died, 64 percent (213) had far advanced tuberculosis when they were first admitted. These 213 far advanced cases represented 37.6 percent of all far advanced cases. Thirty-one percent of the deaths, or 101 cases, were moderately advanced on admission, about 20 percent of all the moderately advanced discharges. The 17 deaths among the minimal cases comprised 5 percent of all deaths and 9.3 percent of the minimal discharges.[4]

In the five sections which follow, death rates for some of the classifications are presented for the first year as well as for the whole 5-year period so that the reader may observe the differences in mortality between designated groups immediately after discharge.

Table 1 presents the procedure used in preparing the life tables and mortality rates. The basic unit used was the person-year. Of the

Table 1. *Annual mortality rates during 5 years after discharge for all patients admitted for the first time and discharged between July 1, 1941 and June 30, 1942*

A	B	C	D	Per 100 discharges		
				E	F	G
Year after discharge	Population at beginning of period	Deaths during period	Death rates each period $\frac{C \times 100}{B}$	Alive at start of each period	Total survivors at end of each period [E−(E×D)]	Cumulative total deceased by end of each period
0–1	1,245	138	11.1	100.0	88.9	11.1
1–2	1,107	71	6.4	88.9	83.2	16.8
2–3	1,036	53	5.1	83.2	79.0	21.0
3–4	983	44	4.5	79.0	75.4	24.6
4–5	939	25	2.7	75.4	73.4	26.6

1,245 persons considered at the beginning of the study, 138 were lost through death the first year after discharge, making a death rate of 11.1 per 100 person-years of exposure to the risk of dying. In terms of 100 persons, this meant that 88.9 survived to the beginning of the second year. Of the 1,107 persons exposed to this risk the second year 71 died, giving a death rate of 6.4 per 100 person-years. The cumulative mortality through the second year was 16.8 with 83.2 persons per 100 surviving. This procedure was continued through the fifth year by which time 26.6 per 100 were shown to have died and 73.4 per 100 to have survived.

The same procedure was used to obtain the observed death rates

[4] Appendix table A gives a summary of the condition of these patients at the close of the 5-year follow-up in terms of the stage of their disease on admission and their subsequent readmission to the sanatoria.

for each of the sex-race groups (table 2). To determine how the actual mortality rates of the New Jersey tuberculosis patients differed from the mortality of the general population of the country as a whole, the expected death rate (adjusted for the age distribution of the patient group) was compared with the observed death rate for each group for each year, and for the 5-year period.

Table 2. *Observed and expected death rate per 100 persons for the 5-year period following discharge, and for each year separately*

Sex and race	Observed rate					
	Years following discharge					
	All five years	1	2	3	4	5
All races, both sexes	26.6	11.1	6.4	5.1	4.5	2.7
Male	28.4	11.8	8.0	5.5	4.6	2.0
Female	24.5	10.2	4.5	4.7	4.3	3.4
White race, both sexes	23.4	9.9	5.5	4.3	3.9	2.2
Male	25.8	10.6	6.9	5.1	4.3	1.7
Female	20.6	9.1	3.8	3.5	3.3	2.7
Nonwhite race, both sexes	52.2	20.6	14.8	13.0	11.3	8.5
Male	53.1	23.4	20.4	10.3	8.6	6.3
Female	51.4	18.1	10.2	15.1	13.3	10.3

Sex and race	Expected rate [1]						Ratio of observed to expected					
	Years following discharge						Years following discharge					
	All five years	1	2	3	4	5	All five years	1	2	3	4	5
All races, both sexes	4.3	0.8	0.8	0.9	0.9	0.9	6.2	13.9	8.0	5.7	5.0	3.0
Male	5.7	1.1	1.1	1.1	1.2	1.2	5.0	10.7	7.3	5.0	3.8	1.7
Female	2.6	0.5	0.5	0.5	0.6	0.6	9.4	20.4	9.0	9.4	7.2	5.7
White race, both sexes	4.0	0.7	0.8	0.8	0.8	0.9	5.9	14.1	6.9	5.4	4.9	2.4
Male	5.4	1.0	1.0	1.1	1.1	1.2	4.8	10.6	6.9	4.6	3.9	1.4
Female	2.3	0.4	0.4	0.5	0.5	0.5	9.0	22.8	9.5	7.0	6.6	5.4
Nonwhite race, both sexes	6.5	1.2	1.3	1.3	1.3	1.4	8.0	17.2	11.4	10.0	8.7	6.1
Male	8.3	1.6	1.6	1.7	1.7	1.7	6.4	14.6	12.8	6.1	5.1	3.7
Female	4.9	0.9	1.0	1.0	1.0	1.1	10.5	20.1	10.2	15.1	13.3	9.4

[1] Based on United States life tables.

The expected rates were based upon the death rate at each year of age among white males, white females, Negro males, and Negro females given in United States Life Table and Actuarial Tables, 1939–41 (7). For example, the number of white males aged 31 in the patient population was multiplied by the death rate for 31-year-old males in the general population to determine the number of deaths to be expected the first year. The expected deaths were subtracted from the original number to give the number of survivors. The number of survivors was then multiplied by the death rate for those aged 32, and so forth for the 5 years. The expected number of deaths for all the white males for each year following discharge was

the sum of the expected number of deaths for each individual age group.[5]

Association of Sex, Age and Race with Subsequent Mortality. The death rates by sex and race for each year following discharge and for the whole 5-year period are given in the first part of table 2. This table reveals differences of varying magnitude in the mortality rates between the sex groups and greater differences between the race groups. The death rates expected if these patients had not all had tuberculosis are also shown in table 2. Whereas the patients had an actual death rate of 26.6 per 100 in 5 years, their expected rate was found to be 4.3 per 100, a ratio of observed to expected of more than 6 to 1. It will be noted that the observed death rates for

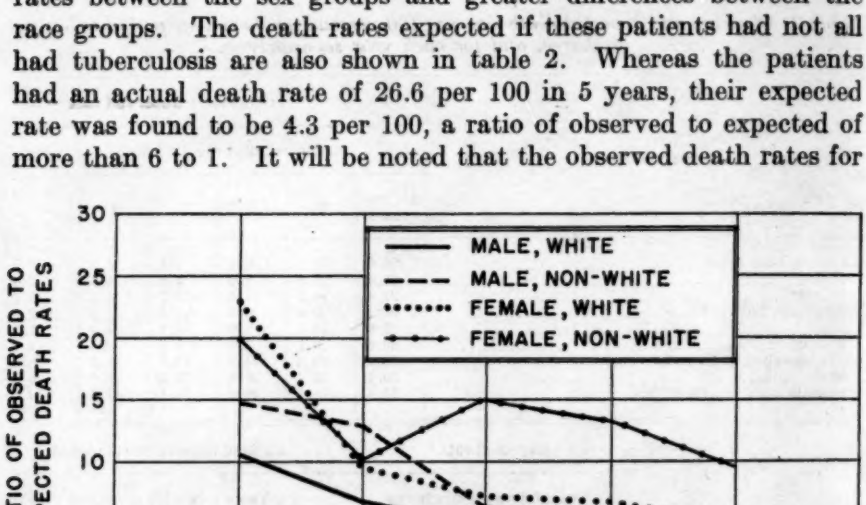

Figure 1. Ratio of observed to expected death rate for each year following discharge.

the white patients taper off by the fifth year and that the white male rate begins to approximate the expected rate. The rates for white females and nonwhite males while declining each year, are still substantially higher than the expected rates for the fifth year. The observed rate for nonwhite females is greater the third, fourth, and fifth years than it was the second year and the observed rate is still nearly ten times the expected rate the fifth year (fig. 1).

[5] The estimated deaths for the white group were the sum of the deaths for the white males and white females. The total Negro deaths were similarly obtained from the Negro male and female totals. Since the New Jersey study group contained only two nonwhite persons who were not Negroes, the Negro expectancies were used for the computations for the nonwhite group. The data for all races were obtained by combining the figures obtained for white and Negro males and white and Negro females. The sum of the survivors was determined by subtraction, and life tables based on 100 persons alive at the beginning of the 5 years were then computed for each of the 5 years for each of the sex-race classes and the designated groupings, by applying the age, sex, and race specific death rates to the patient population.

The New Jersey Life Tables (*8*) were not used for this operation because these tables were prepared for the white race only. Survival rates for each sex indicate no marked difference between the rates for the United States and those for the State of New Jersey in the age range under consideration.

In table 3 the mortality rates by age on discharge are shown separately by sex for the whole group and for the white patients. The relatively small numbers in the nonwhite category did not justify the computation of age specific death rates.

This table reveals that age on discharge appears to be a factor associated with the mortality rates of former patients. Among females the mortality rate for the 5 years following discharge is close to 22 percent in the groups below 50 years of age but rises to 49 percent among those past that age. Among males, the rate is 24.1 percent among the youngest age group. It is lower (16.1 percent) for the 20–29-year olds, rises again (25.7 percent) for those in the 30–49-year age bracket, and reaches 46.7 percent among those over 50.

Table 3. *First year and 5-year mortality rates by sex, race and age* [1]

[Per 100 persons]

Race and age	Males		Females	
	Death rate first year after discharge	5-year death rate	Death rate first year after discharge	5-year death rate
All races:				
17–19	10.3	24.1	9.3	22.2
20–29	6.3	16.1	9.7	21.9
30–49	9.8	25.7	8.0	22.5
50 and over	21.6	46.7	22.4	49.0
White:				
17–19	10.7	25.0	10.4	20.8
20–29	5.0	12.5	8.8	18.1
30–49	8.9	22.9	6.2	17.9
50 and over	19.5	44.8	20.0	44.4

[1] For number of cases see Pub. Health Rep. 63: 435 (1948).

Nearly half of the patients who were 50 years of age or older when they were discharged died within 5 years, and part of this high mortality was believed attributable to causes other than tuberculosis. That this was the case is shown in table 4 which gives the age distribution of tuberculous and nontuberculous deaths in the study group.

Table 4. *Number of deaths from tuberculosis and all other causes, by age, during 5 years following discharge*

Age	Number of deaths			Percent of all deaths assigned to tuberculosis
	All causes	Tuberculous	Nontuberculous	
Total	331	269	62	81.3
Under 20	19	18	1	94.7
20–29	89	84	5	94.4
30–39	65	57	8	87.7
40–49	56	47	9	83.9
50–59	59	45	14	76.3
60 and over	43	18	25	41.9

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The table shows a constantly decreasing proportion of tuberculous deaths with increasing age, so that in the age group 60 and over, only two-fifths of the deaths were attributed to tuberculosis.

To determine whether the patient population suffered excessive mortality from causes other than tuberculosis when compared to the general population, the observed number of deaths from causes other than tuberculosis and the expected number of deaths from all causes were determined (table 5). The latter was obtained from the age-specific death rates of the general population (table 2), including deaths from tuberculosis. If the mortality of the tuberculous patients had been like that of the country at large, the expected number of deaths should have been higher than the observed number of deaths from nontuberculous causes, since deaths from tuberculosis contributed to the expected deaths. As this was not the case with the white patients, it was evident that the group was subject to heavy mortality from nontuberculous causes.

Table 5. *Deaths from nontuberculous causes compared to expected deaths from all causes, by race and sex*

Race and sex	Number of persons	Expected death rate [1] all causes (per 100 persons)	Expected deaths from all causes	Observed nontuberculous deaths	Ratio: column 4 / column 3
	1	2	3	4	
Males, white	613	5.4	33	40	1.2
Nonwhite	64	8.3	5	4	.8
Females, white	496	2.3	11	16	1.4
Nonwhite	72	4.9	3	2	.6

[1] See table 2 for source of these rates.

Association of Marital Status with Subsequent Mortality. Table 3 showed that among males, those in the age bracket 20–29 had the lowest mortality rate. In this age group single men predominated; the first paper showed that 80 percent were single at the time of their admission to the sanatoria. In the similar age bracket for females 54 percent were single and 42 percent were married. Incidentally, 49 percent of all the women were between 20 and 29 years of age. The grouping by age for the women, unlike that for men, did not place a preponderance of one marital category in one age bracket.

The crude and age-adjusted death rates by marital status and sex are presented in table 6. (In this and in appendix table C the divorced, widowed and separated are considered as one group labeled "other.") The adjusted rates are standardized, respectively, to the age distribution of the whole male and the whole female patient population. The differences between the crude rates for the single and married

males were of some magnitude. They were less striking when the age adjustment had been made, but were nevertheless present. Marital status seems to have a bearing on mortality subsequent to discharge among male but not among female patients. This is probably due to the fact that a larger proportion of the married men than the single men were in a far advanced stage of the disease on admission.

Table 6. *Five-year mortality rates by marital status* [1]

[Per 100 persons]

	Five-year rate				
Males	Crude	Adjusted [2]	Females	Crude	Adjusted [2]
Single	16.3	23.3	Single	22.4	23.8
Married	34.3	33.2	Married	23.9	23.3
Other [3]	43.1	59.9	Other [3]	36.2	23.2

[1] For number of cases see Pub. Health Rep. 63: 436 (1948).
[2] "Other" includes divorced, widowed, separated.
[3] Adjusted to the age distribution of the male or female patients.

Association of Stage of Disease on Admission to the Sanatorium with Subsequent Mortality. The mortality rates by stage of disease on admission showed considerable differences between the groups divided into the three classifications: minimal, moderately advanced, and far advanced. Table 7 shows the observed death rates for the first year

Table 7. *Crude death rates 1 year and 5 years after discharge and age adjusted rates, by stage of disease, race and sex* [1]

[Per 100 persons]

Stage of disease on admission and race	Both sexes			Males			Females		
	Observed rates		Adjusted rate [2]	Observed rates		Adjusted rate [2]	Observed rates		Adjusted rate [2]
	1st year after discharge	5 years	5-year death rate	1st year after discharge	5 years	5-year death rate	1st year after discharge	5 years	5-year death rate
All races:									
Minimal	3.8	9.3	9.8	3.5	8.1	7.8	4.1	10.3	9.7
Moderately advanced	6.5	20.4	20.9	7.7	24.3	25.4	4.9	15.6	15.7
Far advanced	17.5	37.6	37.0	17.6	37.3	35.8	17.4	38.1	38.3
White:									
Minimal	3.7	9.2	9.6	4.0	7.9	7.4	3.4	10.2	9.6
Moderately advanced	6.0	18.4	18.8	7.2	22.1	23.0	4.4	13.8	13.8
Far advanced	15.6	32.9	32.3	15.3	33.7	32.3	16.1	31.7	32.0
Nonwhite:									
Minimal	[3] *5.3*	*10.5*	10.5	*0.0*	*10.0*	10.1	*11.1*	*11.1*	10.1
Moderately advanced	*11.4*	40.9	40.9	*13.0*	47.8	53.8	*9.5*	33.3	26.3
Far advanced	30.1	69.9	69.9	38.7	71.0	73.1	23.8	69.1	69.6

[1] For number of cases see Pub. Health Rep. 63: 438 (1948).
[2] Adjusted to the age distribution of all the patients in the designated sex-race class.
[3] Figures appear in italics to indicate that the rate is based on 50 or fewer persons who had five or fewer deaths.

after discharge and the 5-year rates by race and sex. In addition to the differences in rates by stage of disease, there were differences in the sex and race groups in the crude death rates. The rates for the nonwhite patients in both moderately advanced and far advanced groups were about twice those for the white patients in the first and the fifth years. The rate for white females who were in a moderately advanced condition on admission was somewhat lower than the same rate for white males.

The first report in this series showed that among older patients there was a larger proportion of cases in a far advanced stage of the disease than among younger patients. The 5-year mortality rates by stage of disease for each race-sex group were standardized to the age distribution of each group and the resulting adjusted rates are also given in table 7. The differences observed in the death rates between the stages of the disease do not appear to stem from peculiarities of the age distribution of each of the groups of patients, for the same disparities in rates are still observed after the age-adjustment.

The relationship of age to stage of disease and the association of both factors with mortality is shown in a more direct fashion in table 8

Table 8. *Five-year mortality rates by sex, age and stage of disease* [1]

[Per 100 persons]

Sex and stage of disease on admission	Age			
	Under 20	20–29	30–49	50 and over
Males:				
Minimal	*25.0*	*3.4*	*3.0*	*18.8*
Moderately advanced	*21.4*	11.4	26.0	39.3
Far advanced	*28.6*	27.3	30.5	55.6
Females:				
Minimal	*14.3*	*0.0*	*16.1*	*37.5*
Moderately advanced	*12.5*	13.5	14.3	36.8
Far advanced	46.7	36.8	31.8	63.6

[1] For number of cases see appendix table C.

The death rates prevailing for minimal, moderately advanced and far advanced cases are presented by age and sex.[6] When those with the same stage of disease on admission but between 20 and 49 years of age are compared with those past 50, the effect of advancing age on mortality may be clearly seen. Most of the differences between the males and females in the moderately advanced group are due to the differences found in the 30–49 age group.

In the next section the stage of the disease will be considered in relation to the length of the first sanatorium stay, to see whether there is some association between these factors and subsequent mortality.

[6] See appendix table B for the population data.

Association of Length of First Sanatorium Stay With Subsequent Mortality. The 1,245 patients had varying lengths of residence in the sanatorium, ranging from a few days to many years. For convenience of analysis the patients were divided into four nearly equal groups according to length of hospitalization: less than 90 days (under 3 months), 90–181 days (3–6 months), 182–365 days (6–12 months), and over 1 year (13 months or more). Persons admitted to a sanatorium with a diagnosis of minimal tuberculosis appear to require less hospitalization than patients with advanced tuberculosis. The death rates prepared by length of stay therefore included a classification by stage of disease on admission (table 9).

Table 9. *Five-year mortality rates by stage of disease, sex and length of stay*[1]

[Per 100 persons]

Sex and stage of disease on admission	Periods of stay in sanatorium			
	Under 3 months	3–6 months	6–12 months	Over 1 year
All races, both sexes	32.8	31.7	27.1	20.6
Minimal	*10.4*	*6.7*	9.2	*12.0*
Moderately advanced	26.7	25.0	21.8	14.0
Far advanced	50.0	51.9	40.1	26.5
All races, male	35.5	36.2	28.3	19.4
Minimal	*7.7*	*9.5*	6.5	*12.5*
Moderately advanced	31.4	34.2	22.5	16.1
Far advanced	52.5	47.4	41.5	22.3
All races, female	28.3	25.6	25.6	21.8
Minimal	*13.6*	*4.2*	*11.8*	*11.8*
Moderately advanced	*16.1*	15.8	21.0	11.8
Far advanced	46.2	62.5	38.3	30.7

[1] For number of cases see Pub. Health Rep. 63: 442 (1948).

There was a decided difference in 5-year mortality rates between the three groups remaining less than a year (a death rate of around 30 per 100) and those who stayed longer than 12 months (20.6 per 100), even when the stage of disease on admission was not considered.[7] When the stage of disease was included, there was usually a downward trend in the rates, with increasing length of stay. For the moderately and far advanced cases it was evident that the chances of survival were greatly increased if a patient remained in the institution at least a year.

The rate for the moderately advanced patients who stayed less than 3 months was 26.7 per 100, while it was only 14 per 100 for those remaining over a year. Among the far advanced, those who stayed less than 3 months had 50 deaths per 100 while those who remained over a year had 26.5 per 100. The higher death rates for females

[7] Part of this difference may be due to the fact that persons who died in the sanatorium within a year of their admission would not be included in these rates, while those who were discharged (e. g. after a 3-month stay) and then died within 12 months of their admission are included, since they were discharged alive.

with far advanced disease were apparent when the female stay of 3–6 months or over a year was compared with the male stay of the same lengths. Death rates for males with moderately advanced disease were higher than the corresponding rates for females, the differences being greatest when the length of stay was short.

When the groups being studied are sufficiently large to permit additional cross classifications, length of stay is a factor which should be included as it appears from these findings that it has a significant influence on mortality. In institutions having a rapid turn-over of patients, mortality rates, even when specific for sex, race, age, marital status and stage of disease on admission, may be higher than similar rates in institutions which are able to hold patients until their condition warrants discharge.

Association of Condition on Discharge from the Sanatorium with Subsequent Mortality. A measure which should provide an index of the results of sanatorium treatment (the clinical condition of the patients at the time of their first discharge) is next considered. These data indicate that the condition of patients on leaving the sanatorium is directly related to their subsequent mortality, for the proportion who died increased constantly as medical appraisal of the discharge condition became less favorable. The death rates per 100 discharges for the whole group of patients are as follows:

Clinical condition on discharge	*Number dying, per 100 discharges, by the end of 5 years*
Arrested (inactive)	7.8
Apparently arrested (inactive)	12.6
Quiescent (inactive)	20.7
Improved (active)	25.9
Unimproved (active)	53.6

Table 10. *Mortality rates for first year and 5 years after discharge by sex, race and clinical condition on discharge* [1]

[Per 100 persons]

Race and clinical condition on discharge	Males		Females	
	Death rate for the first year after discharge	5-year death rate	Death rate for the first year after discharge	5-year death rate
All races:				
Arrested	1.7	8.3	0.0	7.4
Apparently arrested	1.5	10.8	1.0	15.0
Quiescent	4.7	21.9	2.7	18.9
Improved	9.3	30.2	9.4	21.6
Unimproved	31.1	50.5	35.0	58.0
White race:				
Arrested	1.8	7.3	0.0	6.7
Apparently arrested	1.7	10.1	1.1	11.4
Quiescent	4.2	18.8	1.6	15.9
Improved	7.2	27.7	8.5	18.5
Unimproved	29.7	47.3	32.9	51.2

[1] For number of cases see Pub. Health Rep. 63: 439 (1948).

In table 10 the death rates for all races and the white groups, by sex, are given for the first year and for the 5-year period. Almost one-third of the "unimproved" cases died in a year, and half were dead in 5 years. The differences between sex-group rates is slight except for those discharged "improved," where the rate for males is significantly higher than that for females.

Mortality rates by condition on discharge and stage of disease on admission have also been prepared (table 11). These rates are given for both sexes combined, since a classification by sex resulted in small numbers for some of the groups and the sex differences were not significant. With the exception of the minimal cases, where the rates are based on small numbers, there is an increase in mortality rates as the condition on discharge became less favorable. A large increase is noted between the death rates by stage of disease for those classified as "improved" on discharge and those classified as "unimproved." These findings are, of course, in accordance with expectations. Figure 2 illustrates the material in table 11.

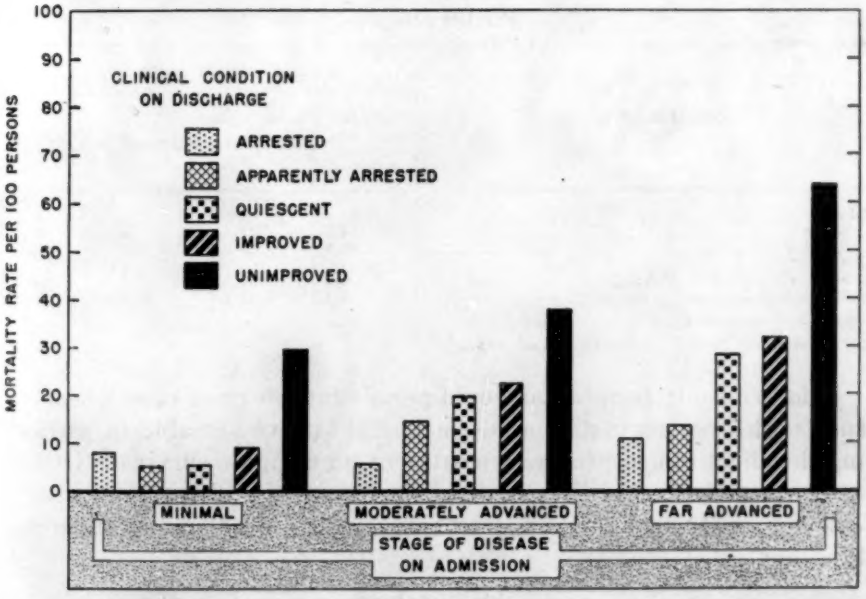

Figure 2. Five-year mortality rates by stage of disease on admission and clinical condition on discharge.

Death rates for single and married patients by clinical condition on discharge and sex were prepared. The data for arrested and apparently arrested cases were combined and the category of divorced, widowed and separated cases was omitted from this tabulation.

Table 11. *Five-year mortality rates by stage of disease on admission and clinical condition on discharge* [1]

[Per 100 persons]

Stage of disease on admission	Clinical condition on discharge				
	Arrested	Apparently arrested	Quiescent	Improved	Unimproved
Minimal	8.0	5.1	5.9	9.3	29.4
Moderately advanced	5.4	14.5	19.7	22.2	37.5
Far advanced	11.4	13.3	28.4	31.7	63.5

[1] For number of cases see Pub. Health Rep. 63: 440 (1948).

These rates are shown in table 12. In all groups except females discharged unimproved, the rate for married persons is higher than that for unmarried patients. Age standardization was not feasible for this table because of the small numbers resulting when an age break-down was made.[8]

Table 12. *Five-year mortality rates by clinical condition on discharge by sex and marital status* [1]

[Per 100 persons]

Marital status and sex	Clinical condition on discharge			
	Arrested and apparently arrested	Quiescent	Improved	Unimproved
Males:				
Single	4.6	14.0	16.9	43.6
Married	15.9	22.0	36.8	52.7
Females:				
Single	9.2	14.3	17.6	73.0
Married	12.1	21.2	20.2	45.6

[1] See appendix table C for distribution of cases.

A larger study population would permit further cross classifications such as the manner of discharge which might prove valuable in assessing the effect of acceptance of treatment on ultimate survival. Other cross classifications will undoubtedly occur to the investigator interested in applying follow-up data to particular problems of tuberculosis control.

Discussion

This study presents some detailed findings about the mortality rates of former sanatorium patients. The data were confined to first admissions so that patients could be followed from a time as close to diagnosis as possible. It is hoped that the results of these observations may be applied to problems of tuberculosis control. The death

[8] See appendix table C.

rates reported in a number of the tables confirm the findings of other investigators in this field. The proportions of cases in each stage of disease are similar to other studies of sanatorium discharges. The differences in death rates by race and sex likewise bear out other findings.

It is difficult to make exact comparisons with any of the other studies listed in the bibliography because each of them had some basic difference in the study group which tends to invalidate comparisons. One study group was limited to single admissions with 90 days or more of residence, another included readmissions in the basic group analyzed, basic differences in the age distribution of the patient populations were found, and so forth. Comparisons which reconciled these differences as far as possible were made between these studies and the New Jersey findings. The New Jersey death rates proved to be remarkably similar to those in other studies, indicating that the relationships between the different factors considered and subsequent mortality are unusually uniform in character. However, some of the classifications and cross classifications with the associated mortality rates in the present study have not been previously reported, to the authors' knowledge.

Admittedly, it is difficult to isolate the effect of a single factor, though the data appear to accord with expectancy when one or two factors such as stage of disease on admission, race, sex, or age are isolated. It seemed reasonable to assume then that the rates by classifications not previously made by other students of the subject probably have a fair degree of validity also. On such a premise, certain conclusions have been drawn from these findings.

Tuberculosis increased the observed death rate well above the expected death rate for each of the sex-race groups, but the increase was more marked for white females than for white males and for nonwhite females than for nonwhite males. The excess of observed to expected deaths seems therefore to be sex-determined rather than race-determined. The lower average age of the female patients explains in part their higher ratio of observed to expected deaths.

The ratio of observed to expected deaths was particularly high for the white females the first year after discharge. For nonwhite females it was almost as high the third and fourth years as the first year after original discharge. The ratio of observed to expected deaths for these 2 years was 15 : 1 and 13 : 1 compared to 20 : 1 the first year. At the end of 5 years, on the other hand, the ratio of observed to expected deaths among white males was close to unity, which indicates that follow-up for possible relapse has become less important each year for this group. This ratio was still so much higher than expectation at the end of the fifth year for the nonwhite males and females and the

white females that follow-up of these groups seems to be called for beyond 5 years. More intensive follow-up during the whole first 5 years also seems to be indicated by the yearly ratios for the nonwhite females.

The data showing death rates for various age groups by sex also point to the need for close post-sanatorium follow-up of patients who were past 50 on discharge, since almost half of this group died within 5 years of leaving the institutions. This heavy mortality probably results from the high proportion of cases in the far advanced stage of the disease on admission, among this age group.

The higher mortality rates of married men in comparison with single men seem to be evidence that social factors influence survival of this group more than the others. Additional evidence is the fact that a larger proportion of married men than single men was in the far advanced stage of the disease on admission. While all persons with tuberculosis must deal with social strains and stresses, it may be that these factors affect the married male group more than other groups. Married men, particularly fathers, are responsible for the welfare of their wives and children, not only financially but in giving direction to family life. Because it is difficult to give up this responsibility and to lose, even temporarily, the position of head of the family, it may be hard for some married men to accept the necessity of entering the hospital and remaining there.

It is more socially acceptable for women to be dependent and it may be easier for them to accept the dependency enforced by tuberculosis. This may account for the similarity in rates between married and single women.

The rapid increase in mortality rates as the stage of disease on admission became more advanced, and the differences in death rates between the younger and older patients with the same stage of disease both point to groups in the population for whom intensified case finding to discover tuberculosis in its minimal stage will be more than worthwhile in the saving of lives. Among the groups who would seem to benefit from intensive case finding are the nonwhite males and females whose 5-year death rates rose from 10.5 per 100 for the cases in the minimal stage to 69.9 per 100 for those far advanced. The mortality experience of females over 50 with far advanced tuberculosis was nearly twice that of the similarly aged females who were in a moderately advanced stage. The rate for the far advanced cases over 50 among the males was 1.4 times as high as the rate for those moderately advanced. Had deaths occurring on first admission to the sanatorium been included in the data, the differences in mortality rates between minimal or moderately advanced cases and far advanced

cases would point even more strongly to the need for early case finding for these age and race groups.

The wisdom of holding patients in the sanatorium for at least a year, if their disease has gone beyond the minimal stage, is plain from the figures relating length of first sanatorium stay and stage of disease on admission to subsequent mortality. Whereas the death rates were from 40 to 52 per 100 for the patients with far advanced cases who stayed less than a year, the rate was 26.5 per 100 for those who remained more than a year. The rates for the moderately advanced cases were reduced from 26.7 per 100 for those staying less than 3 months to 14 per 100 for those remaining more than 12; the rates declined steadily as the stay was lengthened. Discharge against advice, which has not been analyzed in this paper, was closely related to subsequent mortality, increasing it from two to more than three times the rates for those whose discharge had been approved. This fact and the indications of the benefit of longer sanatorium residence point again to the need for measures to relieve the patients of worry so that they will "complete the cure." Special attention to the emotional problems of the patients also helps to increase the chances of survival. The value of the work of the medical social, nursing and rehabilitation team in this connection is unquestioned, for they can help to solve the patient's problems and prevent his leaving prematurely.

The findings in this study by clinical condition on discharge in relation to the stage of disease on admission, and in relation to marital status, seem to give point to the previous discussion. Given early case finding and hospitalization, with an adequate period for treatment (as measured by a favorable condition on discharge), the death rate in the 5 years following discharge is about 6 per 100 (minimal cases discharged as arrested or apparently arrested). Given late diagnosis and poor response to treatment, the death rate is 10 times as high—63.5 per 100 for the far advanced cases discharged unimproved.

That condition on discharge does not tell the whole story, however, is revealed in the comparison of the death rates for single and married men in similar condition at the time of leaving the sanatorium. The married men had higher mortality rates in the next 5 years than the single men, making it evident that other factors affect the mortality of heads of families.

Although early case finding, adequate medical treatment, social services, vocational rehabilitation and adequate provision for the patient's family should help reduce mortality among all patients, such measures would seem to be especially fruitful among married males.

Many more studies are needed to develop further data on the points suggested in this discussion. For example, a cross-classification showing race, sex, stage of disease on admission and length of stay as well as clinical condition on discharge and type of discharge, would reveal groups where special efforts to hold cases for an adequate treatment period would be most valuable. Further exploration of the differences in mortality rates between single and married men should make it possible to determine what factors cause the higher mortality of the married men. Reluctance to enter the sanatorium, and to remain there, and premature efforts to become gainfully employed could be due to economic pressures or to considerations of family stability. The authors hope that the study made in New Jersey has proved sufficiently challenging so that others may want to explore the subject further.

ACKNOWLEDGMENT

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APPENDIX

Table A. *Number of patients by stage of disease on admission, subsequent readmission and condition on January 1, 1947*

Stage of disease on admission	All patients			Not readmitted			Readmitted				
								Alive			
	Total	Alive	Dead	Total	Alive	Dead	Total	Total	Out of sanatorium	In sanatorium	Dead
	Number of patients										
Total	1,245	914	331	894	730	164	351	184	139	45	167
Minimal	183	166	17	150	139	11	33	27	21	6	6
Moderately advanced	496	395	101	364	323	41	132	72	54	18	60
Far advanced	566	353	213	380	268	112	186	85	64	21	101
	Percentage distribution by condition on January 1, 1947										
Total	100.0	73.4	26.6	71.8	58.6	13.2	28.2	14.8	11.2	3.6	13.4
Minimal	100.0	90.7	9.3	82.0	76.0	6.0	18.0	14.7	11.4	3.3	3.3
Moderately advanced	100.0	79.6	20.4	73.4	65.1	8.3	26.6	14.5	10.9	3.6	12.1
Far advanced	100.0	62.4	37.6	67.1	47.3	19.8	32.9	15.0	11.3	3.7	17.9
	Percentage distribution by stage of disease										
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Minimal	14.7	18.2	5.1	16.8	19.0	6.7	9.4	14.7	15.1	13.3	3.6
Moderately advanced	39.8	43.2	30.5	40.7	44.3	25.0	37.6	39.1	38.8	40.0	35.9
Far advanced	45.5	38.6	64.4	42.5	36.7	68.3	53.0	46.2	46.1	46.7	60.5

Table B. *Number of patients by sex, age and stage of disease on admission*

Sex and stage of disease on admission	Age			
	Under 20	20–29	30–49	50 and over
	Number of patients			
Males—Total	29	174	307	167
Minimal	8	29	33	16
Moderately advanced	14	79	123	56
Far advanced	7	66	151	95
Females—Total	53	280	186	49
Minimal	14	44	31	8
Moderately advanced	24	111	70	19
Far advanced	15	125	85	22
	Percentage			
Males—Total	100.0	100.0	100.0	100.0
Minimal	27.6	16.7	10.7	9.6
Moderately advanced	48.3	45.4	40.1	33.5
Far advanced	24.1	37.9	49.2	56.9
Females—Total	100.0	100.0	100.0	100.0
Minimal	26.4	15.7	16.7	16.3
Moderately advanced	45.3	39.6	37.6	38.8
Far advanced	28.3	44.7	45.7	44.9

Table C. *Number of patients by clinical condition on discharge, marital status and sex*

Marital status and sex	Total	Clinical condition on discharge				
		Arrested	Apparently arrested	Quiescent	Improved	Unimproved
Males	677	60	130	105	215	167
Single	252	26	61	43	83	39
Married	367	31	59	50	117	110
Other [1]	58	3	10	12	15	18
Females	568	81	100	74	213	100
Single	250	44	43	35	91	37
Married	260	27	39	33	104	57
Other [1]	58	10	18	6	18	6

[1] "Other" includes divorced, widowed, separated.

Characteristics of Commercial X-ray Screens and Films—VI

By Willard W. Van Allen, B. Sc.*

This is the sixth in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier report in this journal [1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations* [1] [2]

Film and developer [3]	Screens								
	D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	B sample 1	B sample 2	B-2	E-2
Ansco Fluorapid:									
Eastman X-ray	120	150	155	100	125				
Ansco Liquadol	105	125	140	75	100				
G. E. Supermix	155	170	200	100	130				
DuPont Fluorofilm:									
Eastman X-ray	95	115	130	80	100				
Ansco Liquadol	90	110	120	65	85				
G. E. Supermix	130	145	165	90	110				
Eastman Blue Photoflure:									
Eastman X-ray	95	115	130	75	100				
Ansco Liquadol	85	105	115	65	85				
G. E. Supermix	110	120	145	75	95				
Eastman Green Photoflure:									
Eastman X-ray						60	70	95	140
Ansco Liquadol						55	55	85	120
G. E. Supermix						75	75	110	155

[1] Speeds are determined with film and screen in direct contact and therefore do not represent the speed of the same combinations when used in a photofluorograph.

[2] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table; these will include: Eastman Liquid X-ray; Eastman Rapid X-ray; Buck X-ray.

[3] Development time (as recommended by manufacturer of developer): Eastman X-ray Developer (dry ingredients), 8 minutes at 68° F.; Ansco Liquadol, 4 minutes at 68° F.; G. E. Supermix, 8 minutes at 68° F.

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[1] Pub. Health Rep. 64: 581 (1949).

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

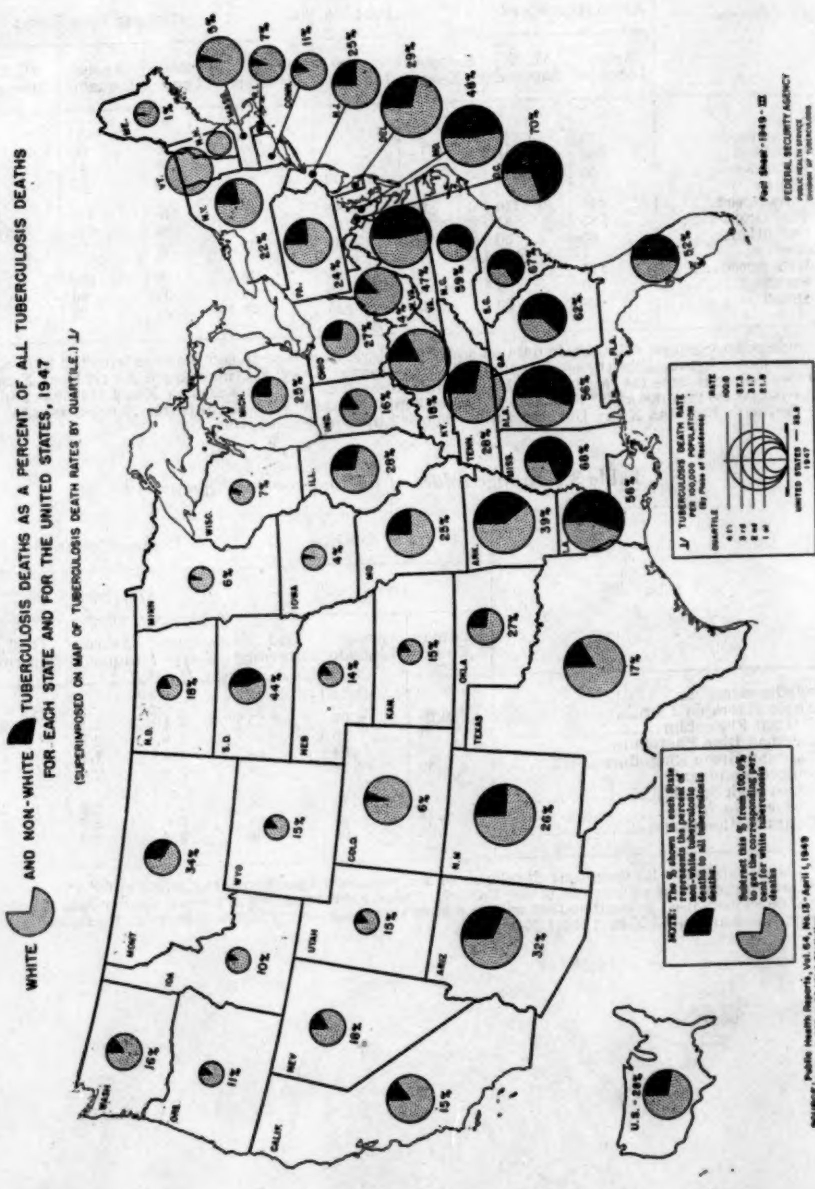
Screens	Film and developer [2]							
	Ansco High Speed [3]		DuPont No. 508			Eastman Blue Brand		
	Ansco Liquadol	G. E. Supermix	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman X-ray	Ansco Liquadol	G. E. Supermix
Buck:								
Xtra Speed	70	75	55	50	55	85	90	90
Midspeed	60	60	50	45	45	70	75	75
Definition	50	50	40	40	40	60	65	65
Eastman:								
Ultra Speed	110	110	90	85	80	140	145	145
Fine Grain	85	85	70	65	65	110	110	105
Definition	60	60	50	45	45	80	75	75
Patterson:								
High Speed	115	115	80	85	80	120	130	135
Parspeed	60	65	55	50	50	90	80	80
Detail	20	20	20	15	15	25	25	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table; these will include: Eastman Liquid X-ray; Eastman Rapid X-ray; Buck X-ray.
[2] Development time (as recommended by manufacturer of developer): Eastman X-ray Developer (dry ingredients) 4½ minutes at 68° F.; Ansco Liquadol, 3 minutes at 68° F.; G. E. Supermix, 3 minutes at 68° F.
[3] Test with Eastman X-ray Developer to be reported in a subsequent issue.

Table 3. *Average values of fog and contrast (gamma)* [1]

Film	Fog densities			Contrast (gamma)		
	Developer [2]			Developer [2]		
	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman X-ray	Ansco Liquadol	G. E. Supermix
Photofluorographic:						
Ansco Fluorapid Film	0.08	0.09	0.23	2.1	1.8	2.1
DuPont Fluorofilm	.21	.15	.40	1.9	2.0	2.1
Eastman Blue Photoflure	.07	.04	.09	1.8	1.8	1.9
Eastman Green Photoflure	.10	.11	.28	2.0	2.1	2.3
Roentgenographic:						
Ansco High Speed	----------	.10	.10	----------	2.8	2.8
DuPont No. 508	.18	.20	.04	2.6	2.7	2.6
Eastman Blue Brand	.06	.08	.06	2.8	3.0	----------

[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F.
[2] Development time as given in tables 1 and 2. Subsequent reports will present similar data for additional developers used in combination with the films shown above. These will include: Eastman Liquid X-ray; Eastman Rapid X-ray; Buck X-ray.


WHITE AND NON-WHITE TUBERCULOSIS DEATHS AS A PERCENT OF ALL TUBERCULOSIS DEATHS
FOR EACH STATE AND FOR THE UNITED STATES, 1947
(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE.) 1/
NOTE: The % shown in each State represents the percent of non-white tuberculosis deaths to all tuberculosis deaths.
Subtract this % from 100.0% to get the corresponding percent for white tuberculosis deaths.
1/ TUBERCULOSIS DEATH RATE PER 100,000 POPULATION (By Place of Residence)
UNITED STATES — 1947
U.S. - 28%
SOURCE: Public Health Reports, Vol. 64, No. 13 - April 1, 1949; National Office of Vital Statistics
FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 14, 1949

The reported incidence of poliomyelitis increased slightly during the week—from 62 cases last week to 85. The increase was due largely to the report of a few cases in States which reported no cases last week and increases in California (from 4 to 9) and Oklahoma (from 2 to 8). The cumulative total since the first of the year is 1,362, as compared with 811 last year and a 5-year (1944–48) median of 728 for the same period. The cumulative total since the average seasonal low point of the disease, however, is 440, as compared with 463 last year and a 5-year median of 252. The excess over last year for the year-to-date total is due to a carry-over from the epidemic incidence in a few States last year.

Declines were reported for the current week in the incidence of measles, influenza, scarlet fever and whooping cough; and for the period since the first of the year new lows have been recorded for diphtheria, smallpox, typhoid fever, and whooping cough. One case each of smallpox was reported in Kansas and North Carolina, making a total of 39 cases to date, as compared with 44 last year and a 5-year median of 195 for the same period. A total of 22 cases of Rocky Mountain spotted fever was reported during the week, 14 east of the Mississippi River and 8 west, of which 4 were in the Mountain States. The total to date is 57, as compared with 29 for the same period last year.

During the current week 8,973 deaths (all causes) were reported in 94 large cities in the United States, as compared with 9,040 last week and with 9,422 in 1948, 9,390 in 1947 and a 3-year median of 9,390, respectively, for the corresponding weeks. Total deaths to date in these cities, 184,434, as compared with 188,621 for the corresponding period last year. Infant deaths in these cities for the current week totaled 611, as compared with 652 last week and a 3-year median of 746. Total to date this year, 12,478, as compared with 13,172 for the same period last year.

Telegraphic case reports from State health officers for week ended May 14, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever *	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				238		29	3		7				7	
New Hampshire				59					1					
Vermont				114					5					
Massachusetts	7	1		692		5	3		157			1	82	
Rhode Island	2			167					4					
Connecticut	10			1,328	2	26			23				8	
MIDDLE ATLANTIC														
New York	7	2	*1	2,183	7	232		1	[d] 125			2	133	2
New Jersey	4		2	1,899	3	44	2	2	81			3	67	
Pennsylvania	12		(*)	2,072	6		2	3	165			4	104	
EAST NORTH CENTRAL														
Ohio	4		5	1,845	6	57	1	1	198			8	68	12
Indiana	3			210	1	4	1		37			1	14	24
Illinois		3	3	237	1	62	2		71				80	4
Michigan *	7	3		771	1	46			209			1	27	7
Wisconsin			16	2,151	1	5	2		36			1	38	
WEST NORTH CENTRAL														
Minnesota	1	1		147	3	4			28				1	
Iowa				78	1	2			8				5	13
Missouri	2		1	269		29	1		14		2	4	6	
North Dakota				59	1				6				4	
South Dakota				124					4					
Nebraska			5	308		1			5			1		
Kansas	1		1	496	2	12			15	1			8	
SOUTH ATLANTIC														
Delaware				50			1	2	2				2	
Maryland *	5		2	186		24		1	38				12	
District of Columbia				115	1	9			4				1	
Virginia	3	1	204	1,085	2	50	1	4	12			2	8	
West Virginia			11	39	1	7	2		16			1	11	
North Carolina	8			943	2		4		11	1		1	33	
South Carolina	3	1	218	570	1	92	1		9			1	23	

District of Columbia				115	1	5								
Virginia	3	1	204	1,085	2	50	1	4	12			2	8	
West Virginia			11	39	1	7	2		16			1	11	
North Carolina	8			943	2		4		11	1		1	33	
South Carolina	3	1	218	570	1	92	1		2			1	20	4
Georgia	3		6	374	1	36			5		2	3	6	8
Florida	2		2	246	2	12	1		2			2	6	3
EAST SOUTH CENTRAL														
Kentucky	2	1	9	487	3	50	3		21				24	14
Tennessee	3	2	29	508	6	73			33			1	20	
Alabama	1		129	277	1	25	5		6			1	5	11
Mississippi [a]	7		11	160		43	1		2		2	2	4	
WEST SOUTH CENTRAL														
Arkansas	2		18	580		57	3	2	4		2	1	8	2
Louisiana	3		4	30	3	39	4		5		2	2	1	2
Oklahoma	1		21	465	1	27	8		3		1	1	1	1
Texas	21	2	549	1,628	4	217	14	1	25			11	104	19
MOUNTAIN														
Montana	1		4	297				1	20					
Idaho			9	192	1	3	2	1	[d] 7				3	
Wyoming				8		13			2		1			
Colorado	3		12	205	1	21	1	1	7			1		
New Mexico	1			63	1	11	1		6			6		
Arizona	2		30	118		11	2		5			1	6	
Utah [a]	1			164		2	2	1	7				12	
Nevada [a]				49			1							
PACIFIC														
Washington	2		4	621	1	1			26				19	
Oregon			3	233	1	38	2		16				22	
California	7		8	1,411	6	19	9	1	[d] 65			4	74	4
Total	141	17	1,317	26,551	74	1,438	85	22	1,551	2	12	67	1,054	
Median, 1944–48	191	6	1,150	25,813	115		35	8	3,358	7	16	69	1,965	
Year to date 19 weeks	3,016	168	68,737	456,655	1,591	42,230	1,362	57	49,433	39	458	841	19,094	
Median, 1944–48	5,012	156	183,596	363,835	3,286		728	29	66,503	195	339	956	40,341	
	(27th)		(30th)	(35th)	(37th)		(11th)		(32nd)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 10		July 31	Sept. 4	Sept. 18		Mar. 19		Aug. 14	Sept. 4		Mar. 19	Oct. 2	
Since seasonal low week	8,130		105,007	509,048	2,435		440		72,131	54		381	29,127	
Median, 1943–48 [b]	12,578		325,649	398,781	4,790		252		105,074	271		481	69,349	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944–45 to 1948–49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever, reported separately, as follows: Missouri 1; Virginia 1; South Carolina 1; Georgia 2; Texas 2; Colorado 1; Arizona 1; California 1; salmonella infection, not included, was reported as follows: Massachusetts 1.
[f] Report for three weeks ended May 14, 1949.
Alaska: Influenza 1; measles 4.
Territory of Hawaii: Measles 192; scarlet fever 1.

PLAGUE INFECTION IN ARIZONA, NEW MEXICO, AND WASHINGTON

ARIZONA

Coconino County.—Under date of May 2, 1949, plague infection was reported proved in a pool of 14 fleas from 17 white-footed mice, *Peromyscus boylii*, trapped April 2, 1949, 9½ miles west of Williams on U. S. Highway No. 66.

NEW MEXICO

Guadalupe County.—Under date of May 10, 1949, plague infection was reported proved in a pool of 148 fleas (3 different species), from 9 rock squirrels, *Citellus variegatus*, taken April 25, 1949, 4 miles south of Santa Rosa; and in a pool of 136 fleas (3 different species) from 5 rock squirrels, *C. grammurus*, taken April 27, 1949, in the same locality.

Taos County.—On the same date plague infection was reported proved in a pool of 107 fleas (3 different species) from 2 prairie dogs, *Cynomys gunnisoni*, and 20 burrows, taken April 26, 1949, at a locality 10 miles north of Taos on State Highway No. 3, thence 8 miles west on State Highway No. 11, thence 1 mile south on ranch road; and in a pool of 53 fleas (2 different species) from 2 prairie dogs, same species, taken in the same locality April 28, 1949.

Union County.—Under date of May 2, 1949, plague infection was reported proved in a pool of 13 fleas (single species) from 2 spotted ground squirrels, *Citellus mexicanus*, and in a pool of 7 fleas (single species) from 8 grasshopper mice, *Onychomys leucogaster*, trapped April 20, 1949, 1½ to 5½ miles south of Clayton on State highway No. 18.

WASHINGTON

Douglas County.—Under date of May 11, 1949, plague infection was reported proved in a pool of 157 fleas (2 different species) from 422 sagebrush voles (meadow mice?) *Lagurus curtatus*, taken April 25, 1949, on State Highway 10B, 16 miles west of Grand Coulee.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—March 1949.—During the month of March 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	33		2		8		13		56	
Diphtheria	2	1							2	1
Dysentery:										
Amebic	3						1		4	
Bacillary	2				1		1		4	
German measles					1				1	
Hepatitis, infectious					2				2	
Leprosy							1		1	
Malaria [2]		1	1		1		89	1	91	2
Measles							1		1	
Meningitis, meningococcal	2							1	2	1
Mumps	1				1				2	
Pneumonia		2			10	1		2	[3] 10	5
Relapsing fever							1		1	
Tetanus	1	1							1	1
Tuberculosis		11		5	6	1		3	[3] 6	20
Yaws							1		1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] Three recurrent cases.
[3] Reported in the Canal Zone only.

DEATHS DURING WEEK ENDED MAY 7, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 7, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,040	9,285
Median for 3 prior years	9,208	
Total deaths, first 18 weeks of year	175,461	179,199
Deaths under 1 year of age	652	660
Median for 3 prior years	660	
Deaths under 1 year of age, first 18 weeks of year	11,867	12,426
Data from industrial insurance companies:		
Policies in force	70,427,342	71,061,430
Number of death claims	12,987	12,507
Death claims per 1,000 policies in force, annual rate	9.6	9.2
Death claims per 1,000 policies, first 18 weeks of year, annual rate	9.7	10.3

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended April 23, 1949.—During the week ended April 23, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11		152	351	18	12	23	100	667
Diphtheria				5						5
Dysentery, bacillary				1						1
German measles				284	20		12	15	10	341
Influenza		87			7	2	1			97
Measles		156	36	115	143	156	87	255	277	1,225
Meningitis, meningococcal			1	1	1					3
Mumps		38	8	104	143	9	40	7	35	384
Poliomyelitis				1				2		3
Scarlet fever		1		55	81		2	4	5	148
Tuberculosis (all forms)		10	12	40	37	16	4	4	29	152
Typhoid and paratyphoid fever				15					2	17
Undulant fever								3		3
Venereal diseases:										
Gonorrhea		6	2	111	50	21	21	34	78	323
Syphilis		7	3	68	34	6	1	9	16	144
Whooping cough		10		71	41	4			1	127

FINLAND

Notifiable diseases—March 1949.—During the month of March 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Poliomyelitis	4
Diphtheria	141	Scarlet fever	349
Gonorrhea	682	Syphilis	96
Paratyphoid fever	251	Typhoid fever	22

JAMAICA

Notifiable diseases—5 weeks ended April 30, 1949.—For the 5 weeks ended April 30, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	1	Leprosy		2
Chickenpox	31	78	Scarlet fever		1
Diphtheria	3	1	Tuberculosis (pulmonary)	55	47
Dysentery	1	1	Typhoid fever	4	57
Erysipelas	1	5	Typhus fever (murine)		1

MADAGASCAR

Notifiable diseases—March 1949.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during March 1949 as follows:

Disease	March 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri			9	0
Bilharziasis	1	0	135	0
Cerebrospinal meningitis	1	0	7	0
Diphtheria	3	0		
Dysentery:				
Amebic	28	0	207	2
Bacillary			2	0
Eyrsipelas			9	0
Influenza	33	0	2,497	41
Leprosy			25	0
Malaria	296	1	38,830	325
Measles	8	0	64	0
Mumps	4	0	210	0
Plague			9	5
Pneumonia, broncho			236	57
Pneumonia, pneumococcic	1	1	275	44
Puerperal infection			3	1
Tuberculosis, pulmonary	4	4	107	25
Trachoma	1	0		
Typhoid fever	2	0	25	5
Whooping cough			292	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—For the week ended May 7, 1949, 248 cases of cholera were reported in Calcutta, India.

Pakistan—Dacca.—During the week ended April 23, 1949, 32 cases of cholera with 12 deaths were reported in the port of Dacca, Pakistan.

Plague

Basutoland.—During the period March 13–26, 1949, 3 cases of plague were reported in Mafeteng District, Basutoland, and during the week ended March 26, 1 case was reported in Maseru District.

Brazil.—Additional reports of plague in Brazil during the year 1948 have been received as follows: October 1–31, 1948, 50 cases, 9 deaths, of which 37 cases 9 deaths occurred in Bahia State, 12 cases in Pernambuco State, and 1 case in Ceara State; November 1–30,

1948, 27 cases, 5 deaths—16 cases 2 deaths in Bahia State, 5 cases 1 death in Ceara State, 4 cases 1 death in Pernambuco State, and 2 cases 1 death in Alagoas State.

Venezuela—Aragua State.—On April 28, 1949, 1 fatal case of plague was reported in Tejerias, Ricaurte District, Aragua State, Venezuela.

Smallpox

Great Britian—England and Wales.—On May 7, 1949, 1 case of smallpox was reported admitted to the Liskeard Smallpox Hospital, at Liskeard in Cornwall. This case is stated to have developed in a young woman residing in a small village a few miles from Liskeard. As far as could be determined she had had no contact with any of the passengers from the Steamship "Mooltan".

India.—Smallpox has been reported in certain cities in India as follows: Week ended April 30, 1949, Bombay 114 cases, New Delhi 71 cases, Madras 29 cases; week ended May 7, 1949, Bombay 88 cases, New Delhi 91 cases, Madras 16 cases.

Java—Batavia.—For the week ended April 30, 1949, 169 cases of smallpox were reported in Batavia, and for the week ended May 7, 150 cases were reported in that city.

Typhus Fever

Tunisia.—During the period April 1–10, 1949, 22 cases of typhus fever were reported in the military area of Zarzis in Tunisia.

Yellow Fever

Brazil—Para State.—On March 27, 1949, 1 death from yellow fever was reported in Cameta, Para State, Brazil.